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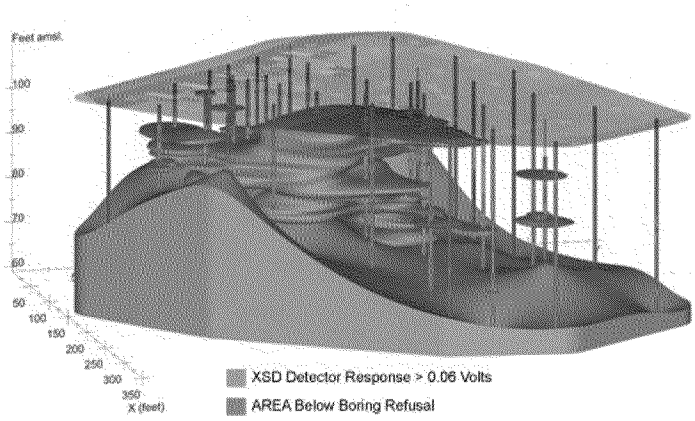
Membrane Interface & Hydraulic Profiling Tool

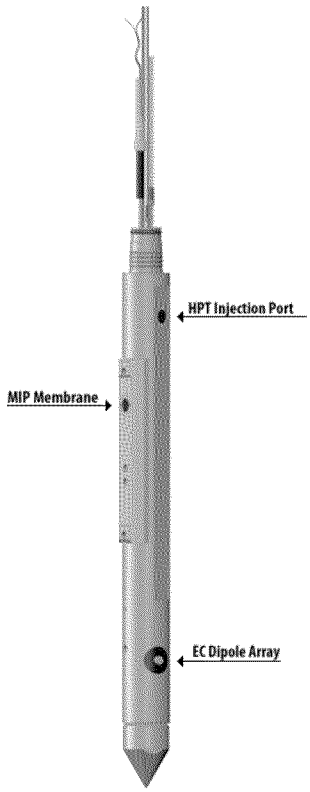
Membrane Interface & Hydraulic Profiling Tool (MiHPT)

The new probe detects volatile contaminants with the MIP, measures soil electrical conductivity with a standard (MIP) dipole array, and measures HPT injection pressure using the same down-hole transducer as the Geoprobe® stand-alone HPT system.

In post-processing the log data with Geoprobe® DI Viewer software, the user is able to estimate hydraulic conductivity (K) and water table elevation, as well as prepare graphical out- puts of the log data.

EVS Data Visualization Model





Benefits of the (MiHPT)

The MiHPT system combines the VOC profiling of the MIP system and the hydraulic conductivity profiling of the HPT system in one tool. Collecting these data sets in a single boring provides a complete picture of subsurface conditions. Because this tool provides a high resolution picture of VOC mass in relation to lithology, as defined by both electrical conductivity and hydraulic conductivity, the MiHPT system is an ideal tool when developing an in-situ remediation plan.

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How does the MiHPT Work?

The MIP is an HRSC system that produces quantitative vertical profiles of volatile organic compounds (VOC) concentrations in relation to lithology. Borings are advanced to develop 3D models and representations of site contamination, typically presented as cross-sections. This system provides real-time information to allow users the ability to make real time field based decisions.

The MIP system operates by heating the soil and groundwater adjacent to the probe to 120 degrees Celsius to volatize VOCs in the immediate vicinity of the MIP membrane. The volatized VOCs diffuse across the membrane into a closed, inert gas loop that carries the vapors to a series of detectors housed at the surface. Each detector produces a continuous profile (plotted with respect to depth) to indicate the presence of various VOC compounds. Each detector operates differently and therefore can detect different classes of compounds. Vironex operates the MIP system with an electron capture detector (ECD), halogen specific detector (XSD), photo-ionization detector (PID), and flame-ionization detector (FID). Soil conductivity is also measured during each boring and can be compared to the chemical logs to better understand where the VOCs are present. More information regarding the operation of each detector is provided below.

One of the key parameters for successful in-situ remediation is the hydraulic conductivity of target intervals. The HPT system is designed to evaluate the hydraulic behavior of unconsolidated materials by injecting clean water into the subsurface and recording changes is the associated pressure. The HPT system records these changes in pressure and calculates the associated hydraulic conductivity. Both of which are plotted in vertical profiles with respect to depth.

The HPT system operates by injecting water into the subsurface at a flow rate (usually less than 300 mL/min). The injection pressure provides an indication of the hydraulic properties of the soil. A relatively low pressure response indicates a relatively high porosity; conversely, a relatively high pressure response indicates a relatively low porosity. During post boring processing, the changes in pressure and flow are utilized to calculate an estimated hydraulic conductivity. Additionally, an electric conductivity dipole is integrated into the HPT probe to interpret the lithology of the subsurface.